SOUND CONTROLLED TORPEDO NEWEST NAVAL WEAPON

Dreadnoughts May Be Doomed by Invention of "Wizard of Knott End," Recently Demonstrated on British Warship Terpsichore

THEY call him the "Wizard of Knott End"—Knott End being in England, over on the coast of the Irish Sea. Such is the title by which rather staid John Gardner is known to his neighbors. He has done things and still is doing things which smack of the black art. Wireless is one of his particular hobbies, but Gardner's wireless is not of the sort of which the world has heard so much.

John Gardner has fame not only in his home; he is much esteemed within the inner circles of the British Admiralty. Over in England they have what is termed the official secrets act, and prosecution and possibly prison walls are the penalties one may incur by disclosing any particulars about the nation's defences or experiments pertaining thereto. Accordingly this modern wizard is not permitted to talk and his work can be described only by inference.

This is all by way of introduction to tests made a short while back by the British naval authorities upon one of the old royal cruisers. According to the meagre accounts that have reached the public H. M. S. Terpsichore was towed out into Stokes Bay after a mysterious metal box had been attached to her bottom away below the water line. Once there she was anchored and abandoned by her temporary crew.

When these had reached a safe distance something happened. There was a great geyser of water sent skyward right alongside the ship, and before she could recover from her violent lurch down upon her deck fell the thundering tons of that upheaval. The mysterious box had functioned perfectly in obedience to the silent and invisible command of the battleship eight miles away.

A great rent was torn in the steel skin of the Terpsichore, and it was all the big wrecking pumps of the five dock yard tugs that rushed to her aid could do to arrest the inundation and keep the craft afloat until she could be towed back to port and dry docked. The wound was one that would have sent the vessel to the bottom had she been similarly stricken in time of war. This was England's latest effort toward meeting the wireless achievements of neighboring Continental maritime Powers.

Some years ago John Gardner built a small submarine which he was able to guide by means of submarine sound signals. He built that boat after he had made extensive laboratory experiments. These were the achievements which won for him the name of the "Wizard of Knott End."

In his workshop he had assembled mechanisms that represented the starting and stopping, the steering and the firing apparatus for a torpedo. They seemed to know their master's voice, because they would do what he bade either when he whistled or called his orders in a certain key. In other words, the mechanisms responded to a fixed tone or musical pitch, and would not act if the call was in any other key.

Since then John Gardner has gone steadily on improving his system, and he was prompted to do this because he believed Hertzian wave wireless had a number of weaknesses. First, there was the fear of interference on the part of an enemy sending out purposely confusing ether vibrations; and, second, he realized that the transmitting capacity of the air varied day and night and was particularly unreliable when thunderstorms were brewing or active. He wanted to get a stable medium through which to send his directive signals, and experience told him that water would answer his purpose best. It was logical that he should choose sound waves instead of electrical waves for his controlling impulses, because sound will travel four times as well and four times as far through the water as it will through the atmosphere.

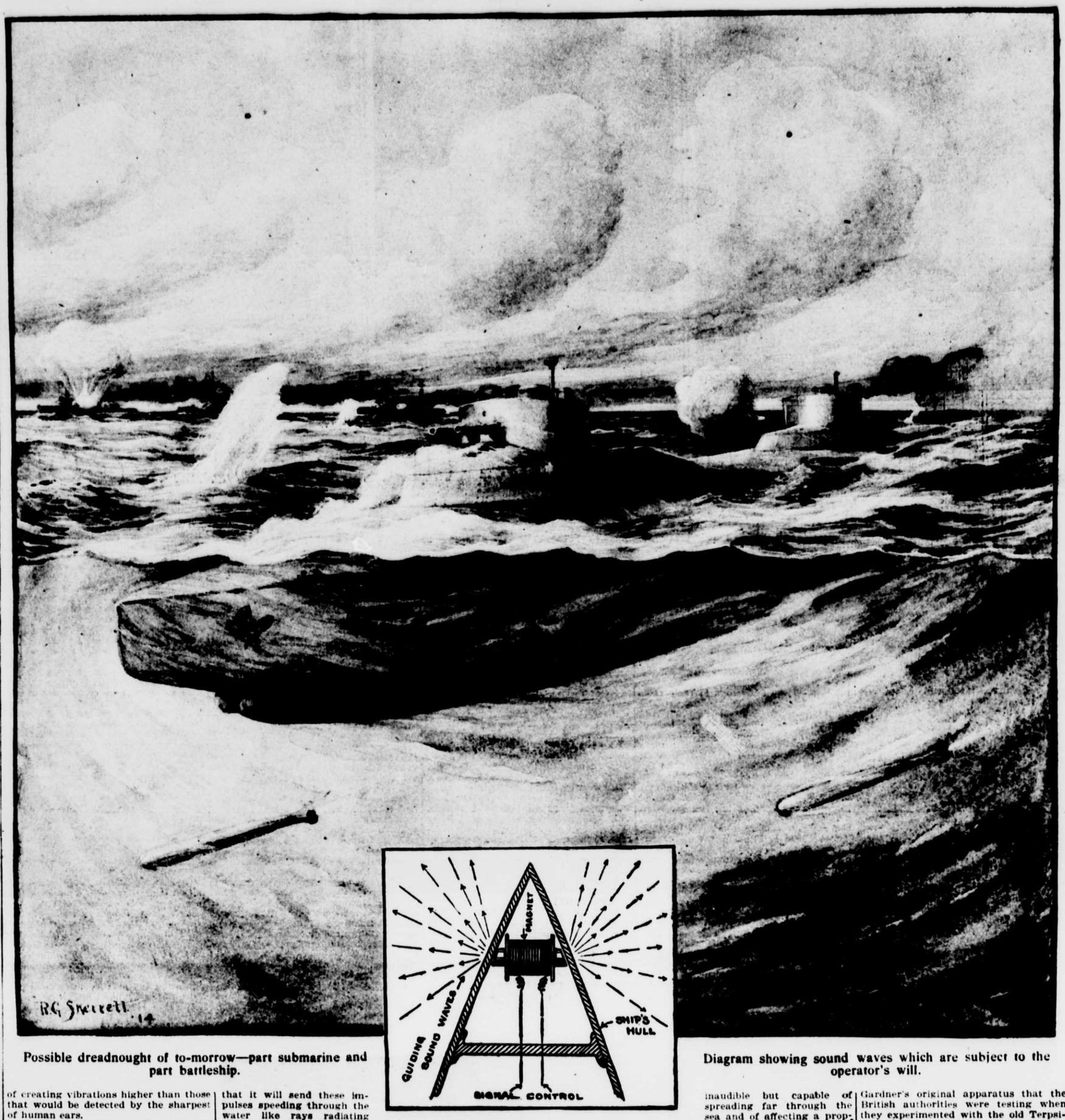
Gardner showed that he could arrange the sensitive receiver on his submarine so that it would respond either to one chosen note or to a chord of them, and unless all of these were sounded simultaneously the submarine would be indifferent to the tonal waves. Of course it was not long before the military critics picked this system to pieces. They declared that these sounds could be detected by a suitably arranged submarine signal receiver, and they asked: "What would prevent an enemy from producing the same tone or tones under water and thus neutralizing or completely upsetting the sounds intended to operate the little boat or a torpedo similarly equipped?"

An ordinary man would perhaps have been nonplussed by such a situation, because to the average mind the whole scheme depended upon the employment of audible signals, for how otherwise could the desired pitch be chosen? You don't know John Gardner, so you can't realize what it means when his lips set firmly and his square chin takes on an added touch of angularity. Just the same, picture to yourself this outward show of determination on the part of a resourceful man.

In all of its essentials the Gardner receiver is a mechanical substitute for the human ear. It is far simpler than the ear because in that there is a receiving apparatus which boasts something like 3,000 extremely minute fibres constituting the terminals of the acoustic nerve. Each of these fibres is responsive only to a particular note and is deaf to all others.

But the human ear has its limitations. There are sounds that it cannot hear, sounds whose vibrations are either too few or too many. The higher the sound the greater the number of its vibrations. Now we shall see how John Gardner dodged what to the average person would have seemed an insuperable difficulty.

He set about making his receiver still more sensitive so that it would be affected by inaudible sounds. This was [illegible] appear at first [illegible] sound [illegible] the English so well I am sleeping [illegible] bed."



Possible dreadnought of to-morrow—part submarine and part battleship.

Diagram showing sound waves which are subject to the operator's will.

of creating vibrations higher than those that would be detected by the sharpest of human ears.

Of course he had to have for this purpose a resonator that he could control perfectly, and once more electricity came to his aid. No, he did not use a submarine bell or a submarine horn of a complicated nature, but instead he devised a way to turn a ship itself into a source of sound.

He has made it possible to cause the hull or skin of a vessel to quiver so that it will send these impulses speeding through the water like rays radiating from a source of light. He uses an electro-magnet which he places preferably down below water and in the very bow of the craft, and the poles or terminals of the core of this magnet are close but not in contact with the inner surface of the ship's steel skin.

An electro-magnet is active only when current flows through the enveloping coil, and then streams of magnetism flow out of one end of the core and circle around the coil and return by the other end of the core. The speed with which the magnet is energized or de-energized will set up corresponding vibrations in the adjacent plating. If these vibrations are not too fast sound will be produced which the human ear can detect; otherwise they would be inaudible but capable of spreading far through the sea and of affecting a properly tuned receiver.

The advantage of this inaudible system is that an enemy would be just so much less likely to suspect the approach of a torpedo directed in this manner, and even if he were on the alert it would take a good deal of time and a peculiarly fashioned detector to pick up and to identify the guiding note. It was undoubtedly this evolution of John Gardner's original apparatus that the British authorities were testing when they experimented with the old Terpsichore and the exploding of a tuned torpedo fastened to the bottom of that ship was but one step in a much more important field of application.

The principal weakness of existing submarine boats lies in their comparatively low speed when running totally submerged. As a general proposition this does not exceed ten knots an hour, while the big dreadnoughts are capable of doing twenty-odd knots and foreign battle cruisers make thirty knots and more. On the surface the submarine can do better, but to expose itself there is to give warning of its approach except at nighttime.

Modern strategists believe that a modified form of submarine will be the ideal craft. Instead of using torpedoes of the usual type the proposal is to employ a weapon which will, in fact, be a combination of submarine and torpedo, only the submarine will be of a crewless order.

The moment you get rid of the human element in a submarine it is possible to change greatly its character and also to employ a propulsive power which cannot now be utilized. By excluding all problems of ventilation, habitability, &c., a submarine can be made a sort of magnified torpedo and capable of much higher speed than is now attainable. Instead of carrying two or three hundred pounds of explosive a weapon of this nature could just as easily be loaded with a ton of guncotton or some other more destructive material.

The naval architect has done pretty well in subdividing and honeycombing the under water body of fighting ships so that the ordinary torpedo cannot sink a dreadnought outright, although it may wound a battleship more or less grievously. But this same expert cannot provide against the subaqueous attack of a ton of explosive unless the heavy ship of the battle line is completely remodelled. This is not such a simple matter—in fact would completely revolutionize existing practices and the arrangements of the powers of attack and defence on the part of the ship.

Either this revolution is coming or a complete change will take place in the getup of the so-called capital ships. At least this is so if Mr. Gardner's scheme be worked out to its logical climax.

What he would do is nothing short of building a semi-submerged battery of high speed which would be the mobile base from which he could direct his torpedo attack. This vessel could withstand the heaviest of blows from an enemy's guns and its powers of offence would be principally centred in exceptionally large torpedoes or small submarines—call them what you will. Each of these giant weapons would be a dirigible, and not self-controlled after the manner of the existing automobile torpedoes.

To direct these torpedo submarines each would be equipped with the Gardner inaudible sound control apparatus and each of these in turn would have its own keynote. The observer in the conning tower would have these weapons released or launched from the parent craft, and with this done he could guide them upon their journeys at will. It would not be a case of starting them upon their errands and leaving a hit to chance, but they would swerve and alter their courses to meet the changing manœuvres of an enemy's squadron.

Each torpedo submarine would have chosen for it its own particular target. Torpedo nets could not keep them away from their quarry; by sheer force and weight they would tear their paths clear through. More than this, they could not be exploded prematurely, but would be set off only when the proper signal reached them from the control station if so desired.

During the day all that would be seen of the torpedo submarines would be a couple of thin metal rods reaching above the water's surface and adorned with little guide flags, and at night these signal masts would be tipped with lights, screened so that they would show only toward the parent craft. In this way each weapon could be traced upon its course and there would be no confusion, each answering only to its special note and going steadily after its particular objective.

Even though these telltale rods should be seen by the enemy this would not help him, because the body of the torpedo submarine would be submerged deep enough to be beyond the reach of gun fire while capable of advancing faster than the foe could retreat. True, if these rods were destroyed by shot or shell it would handicap directing the weapons; but think of the brief interval and the nervous strain upon the marksman trying to hit targets of this sort rushing toward him at a rate of possibly forty miles an hour! It would be a small chance upon which to pin one's hope of escaping possible annihilation. A sea wolf with a brood of evil bent whelps of this sort is something that the mightiest of modern dreadnoughts could not resist.

Undoubtedly John Gardner's neighbors have now more reason than ever to dub him the "Wizard of Knott End." What he thus adds to the potential terror of war paradoxically makes him deserving of a more complimentary title, because he is probably making actual strife just so much less likely. In this way dreadnoughts may become back numbers. The more destructive war becomes the less apt are nations to go to battle.

AN UNWRITTEN PAGE IN THE HISTORY OF THE FRENCH NAVY

By JOHN TAYLOR PARKERSON.

A SMALL army of longshoremen were engaged in heaving coal into the bunkers of the big French liner France from half a dozen long, narrow barges that stretched the full length of the ship. It was the week before Christmas, and the longshoremen, mostly Americans, had caught the holiday spirit and went noisily about their task. On deck, however, not a soul was to be seen, and but for the constant shoveling of coal and intermingling sounds of the longshoremen one might have imagined himself far removed from the hustle and bustle of a great city.

In the main saloon of the vessel a tall, lean sea-farer was lazily polishing some brasswork, while seated on a divan in a corner of the spacious room were two stewards playing checkers. They were nearing the end of an exceedingly close and interesting game, when the France's skipper, Capt. Poncelet, unexpectedly entered the saloon.

The stewards, who also should have been polishing brasswork instead of whiling away their time, looked at each other in blank amazement and the checkerboard fell to the floor. Scattered here and there were the white and black men.

The captain stood gazing at the stewards a full half minute.

"Tut, tut!" he exclaimed finally in disapproval of their apparent fright. "And now," he added, smiling critically, "you have both lost the game!"

The stewards gathered up the checkerboard and checkers and went about their work sheepishly, while Capt. Poncelet walked slowly to his cabin.

"Checkers!" he said, as he lighted a fresh cigar and gazed dreamily at a picture of the great Napoleon, which hung just above a small brass bedstead in his cabin. "I, too, played checkers once, but my men were battleships and my checkerboard the map of the world.

"Yes," he continued reminiscently, "that was a long time ago. I was young and enthusiastic and felt as Napoleon himself must have felt toward the English when he was taken to St. Helena. And now what changes! I [illegible] the English so well I am sleeping [illegible] bed."

He laughed as he explained that the brass bedstead under the picture of Napoleon was none other than that provided for King George aboard the Medina when the British monarch sailed for India to attend the durbar.

"But to get back to my story," said Capt. Poncelet. "We were speaking of checkers. Well, the game I played is an unwritten page in French and English history.

"I was a staff officer to the Admiral-in-Chief of the navy stationed in Paris. At the time the relations between France and England were terribly strained, and this feeling was intensified because the English thought some of our African subjects were trying to step on their toes in Egypt, or in other words attempting to cut a line from the Cape of Good Hope to Egypt. The war fever was at white heat. So serious was the situation that the time had actually been set for a formal declaration of war.

"Eleven o'clock at night it was, and I shall never forget the few hours preceding. I had been conducting a complete naval campaign on paper for days—playing checkers,' as it were. Every move in the event of war had been mapped out, and in my enthusiasm I prided myself on having defeated the English before the first shot had been fired.

"Well, when I was informed of the definite programme I hurried home to bid my family good-by. My wife had anticipated my coming and had gathered together what clothing and other articles I needed. I'll tell you this was certainly the most trying moment of my life, worse than any experience I've ever had at sea. My poor little wife stood gazing at me blankly, her eyes filled with tears, and I'll confess it was all I could do to keep my wits about me. I placed my arms around her tenderly and kissed her, and presently she murmured:

"'If it's for the glory of France, Eugene, then, of course, you must go. But——' and she stammered as in pain, 'you—you'll co—come back to— to me, won't you, Eugene?'

"Something stuck in my throat, and for the moment I was without voice.

"'Y—yes,' I managed to say at length. 'I'll come back, little woman, unless——'

"'Great God!' she screamed, swooning.

"My time was up. I called to her mother, who was living with us, and bade her care for Mme. Poncelet. Another minute and I was off, carrying with me a small silk flag my wife had made for me before we were married and while I was a naval apprentice.

"Back at my desk I fought the war over and over again. As against ours the British ships seemed to me mere targets conveniently placed for receiving French shot. One by one I could see them disappear, until France, my dear France, should come into her own again.

"I pictured in my mind's eye what we might expect as the fruit of our victory. A thousand and one thoughts came to me. The parting words of my wife rang in my ears; I was obsessed, madly obsessed, with love for my country. I wanted to do something big and I could not wait.

"The long, weary days spent in determining the fortunes of war on paper had whetted my nerves to the breaking point. And now, with the hour of conflict in sight, the excited whisperings and mutterings on all sides and the occasional humming of the 'Marseillaise' my blood was racing.

"I thought of the dead Napoleon and prayed that his spirit might guide us on to an even greater glory than any of us had conjectured. Suez, then India—it all came to me like a flash. If the French in Africa had stepped on English toes in Egypt, then with war we would humble England all the more. There could be no other solution. It was an old debt, and at last the cards had turned: England would be compelled to pay!

"Well, there we were, packed and waiting for the signal to proceed. I had been assigned to the Avalanche, one of the stoutest little gunboats that ever sailed the sea. The entire naval staff was on edge. Here, there, everywhere was the wildest excitement. Pages rushed to and fro with orders. To all appearances the war was on in earnest, save for the roar of the cannon.

"To me it gave a great feeling of joy. I was thrilled and so were all of my comrades. We danced, sang, and did many other things to emphasize the spirit of loyalty and devotion that stirred within us.

"I shall never forget one incident. An old man, bent with years and hobbling about on a cane, entered the large room where we of the staff of the Admiral-in-Chief were stationed.

"'Felix!' he called faintly. 'Where is my Felix, my boy?'

"A youth of perhaps twenty-one, robust and flushed with health, stepped forward and, throwing his arms around the old man's neck, said:

"'Why, father, here I am. But why have you ventured out in the chill air? I bade you good-bye more than two hours ago.'

"'True, my lad,' answered the old man, 'but I wanted to see your face just once more. I wanted to make sure you would be here when the call came.'

"'Father,' whispered the young man, bowing his head.

"'And I want you to fight for your country as long as there is a drop of blood left in your——'

He did not finish the sentence, but sank to the floor.

"'Father! Father!' cried the son, bending over the prostrate form and lifting the old man's head tenderly.

"The eyes were partly closed, but there was a smile on the wrinkled face. It was a smile of triumph, even in the hour of death.

"Well, we carried the body into an adjoining room, where we wrapped a flag about it. Then, leaving the son alone with the corpse, we repaired again to the assembly.

"The death of the old man had sent a cold chill through every one of us, and for the moment we stood around gaping at one another. The hands on the clock pointed to 10:30. We began to stir, forgetting that for fully twenty minutes there had been a lull in the activities of our superiors. What it all meant we did not know.

"An explanation was forthcoming. Word passed that an amicable settlement of the differences had been reached. We were told that we might return to our homes.

"Great Vesuvius! Well, sir, you could have knocked any one of us over with a feather. You never saw such a disappointed lot of men in your life. It was more than we could believe, and we felt like taking matters into our own hands and fighting, anyhow. I don't believe if the English had exploded a bomb in the very quarters we were occupying they would have caused us such a shock.

"An amicable settlement of all differences! Why, I'll tell you, you have no idea what the feeling was, unless you've planned what you believed would be the crowning achievement of your life, after months of brain racking and toil, only to see everything shattered in a second, like the uprooting of a tree during a cyclone.

"We were angry, every one of us, and why not? We were angry with England, France, even with ourselves. The fire burned within us, yet we could do nothing. And better so. It would have been a terrible conflict, and both countries would undoubtedly have paid a terrible price in blood in the end. A difference of twenty or thirty minutes in the transmission of a message, as I afterward learned, might have changed the map of the world."

Capt. Poncelet arose and walked toward the open door of his cabin. Every lineament of his countenance expressed a boyish enthusiasm in the events of his past career of twenty-six years in the French Navy.

"Well," he sighed, "after the war, or perhaps I should say the war that was to be, we buried our dead. A small procession formed and we carried to his home the body of the old man whose pathetic end I have related. A white haired old lady met us at the door. Her eyes peered into space and she seemed lost in her own sorrow. Each of us understood and departed silently, sympathetically.

"War," added the captain, after a pause, "is what your great Gen. Sherman said of it, and make no mistake about that. Since my experience as a staff officer to the Admiral-in-Chief of the French Navy I have seen active service in two wars; that is, in the Tunis expedition, 1882-84, and during the Tonkin campaign, 1885-87. I saw some pretty stiff fighting, too, but nothing to compare with the anxious moments spent in waging a checkerboard war on Great Britain."

Terrific Possibilities of New Under Sea Projectile Which May Be Guided at Will of Operator in Tower of Parent Ship

Streets Less Encumbered

"THE streets of the city are freer of encumbrances at present than they have been for the last ten years," remarked a New Yorker the other day. "This condition is due to the fact that immediately after the installation of the new enamel street signs at the corner the former stanchions consisting of specially designed posts and antiquated lampposts were made useless.

"The stanchions now bearing the street signs are the electric light poles which were installed in all sections of the city about two years ago. They are more up to date and artistic than the old stanchions and consequently it was decided to rid the city of the old timers as soon as possible. Gangs of workmen rooted up the former stanchions without regret and carted them away after filling the holes made by their removal.

"Persons walking along Columbus avenue and other avenues in the city will notice the spots where the old posts and lampposts used to stand. Their removal has rid the street corners of impediments and has given a neat and up to date appearance to the thoroughfares. In many sections of the city the only lampposts now remaining on street corners contain fire alarm boxes. Their stay is insured until a new alarm system will cause their removal."